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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

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Author

TITLE

FOREST INSECT SURVEY

FALL RIVER AREA

SHASTA AND SISKIYOU COUNTIES, CALIFORNIA

Season of 1943

by

P. C. Johnson  
Berkeley, California  
February 10, 1944

SUBJECT-

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Forest Insect Laboratory  
Berkeley, California  
February 10, 1944

FOREST INSECT SURVEY  
FALL RIVER AREA  
SHASTA AND SISKIYOU COUNTIES, CALIFORNIA  
Season of 1943

APPROVED BY:

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## ABSTRACT OF RESULTS

### THE 1942 INFESTATION (Complete record)

Total amount of pine timber killed by bark beetles (Table 3):

Number of trees	1,210
Volume	1,300,000 board feet
Average volume per acre	17 board feet
Proportion of virgin pine stand	0.1 percent

Classification: Endemic

Primary insects: Western pine beetle in ponderosa pine

Trend: Decrease of 5% percent over 1941 infestation

Control work completed: No direct measures recommended. Heavy cutting in the Wiley Ranch Unit during 1943 by the McCloud River Lumber Company follows indirect control practice recommended by 1942 survey.

### THE 1943 INFESTATION (Partial record)

Classification: Endemic

Primary insects: Western pine beetle in ponderosa pine

Trend: Little change over 1942 expected

Control work recommended: No direct measures necessary. Recommend normal logging operations be directed to and continued until virgin stands in the Lava, Dana and Cayton Units are fully utilized before cutting stands in Clark Creek and Dickson Flat Units or sanitation-salvage treatment for parts of Lava, Dana and Cayton Units to be held for periods longer than eight years.



## Forest Insect Survey

### FALL RIVER AREA

Shasta and Siskiyou Counties, California

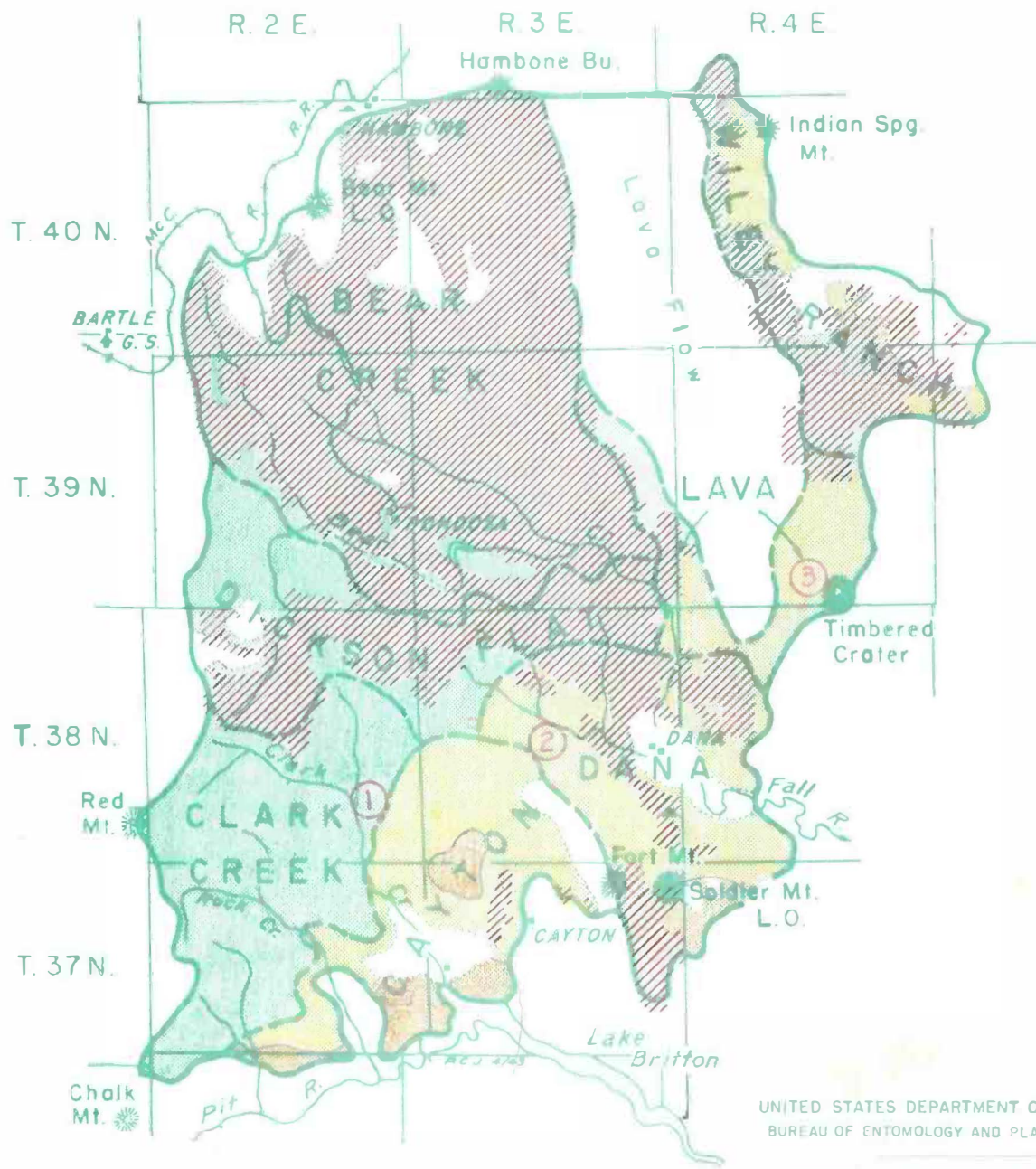
Season of 1943

### INTRODUCTION

In recent years the principal forest insect problem in the Fall River Area (see map) has been one of damage to mature ponderosa and sugar pine timber from attacks of bark beetles. In 1932 this damage became so great that serious depletion of the stands resulted and direct control programs were undertaken by the McCloud River Lumber Company and the U. S. Forest Service on a portion of their lands. Since the possibility of recurrent beetle infestations was great on the treated as well as the untreated timberlands, a program of annual surveys was begun in 1933 by the forest insect laboratory at Berkeley, California, to keep a close check on those which might arise.

The object of these surveys was to (1) detect serious outbreaks so that control measures could be taken in time to prevent serious damage to timber, (2) to study the action of beetle infestations in this area and (3) to measure or estimate the amount of damage resulting from these infestations. From 1933 to 1940 these objectives were attained from measurements made from a series of 320-acre check plots representing the different stand conditions encountered in the area. Logging activities eliminated most of these so that since 1940 a series of roadside strips have been used for the same purpose.

Fortunately, the damage from beetles in the Fall River Area has been less severe than in other pine areas in northeastern California. This may be attributed in part to the better timber growing sites and the heavier precipitation which has resulted in mixed coniferous stands bearing close resemblance to those along the west slope of the Sierra Nevada-Cascade range. The infestations in these latter stands have been characterized by relatively long periods of endemic insect activity between violent but short-lived epidemics. Since the climax of the last serious epidemic in 1932, the timber killed annually by beetles in the Fall River Area has averaged less than 100 board feet per acre, a figure which probably does not exceed the average annual gross increment for pine in this area. Consequently, no direct control measures have been necessary.



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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

**FOREST INSECT SURVEY**  
FALL RIVER AREA  
SHASTA NATIONAL FOREST, CALIFORNIA

SEASON OF 1943

**LEGEND**

- Pine Timber Type
- Cutover Land, as of 1/1/43
- Boundary Lines
- Reporting Areas
- Entomological Units
- Ground Samples
  - Plot
  - Roadside Strips
  - Line Strips
  - Line Plots
  - Road-Counts

- Low Beetle Hazard (II)
- Moderate Beetle Hazard (III)
- High Beetle Hazard (IV)

SCALE 0 2 4 6 MILES



A thorough analysis of the beetle infestation potential of this area was made by the Forest Insect Hazard Inventory <sup>1/</sup> in 1938. The Inventory segregated the various pine stands by degrees of beetle hazard which are still in effect today (Table 1). With the information supplied by the Inventory, it has been possible to determine the probable location and extent of the most threatening infestations which may visit the area and to plan measures to forestall them by hazard reduction or beetle control operations. Both of these can be accomplished by means of selection cuttings which remove and utilize the green beetle susceptible pines from the stands before they are attacked. The only difference between the two is the degree of cutting <sup>2/</sup>.

The possibilities of obtaining beetle control indirectly have been touched upon in previous insect survey reports for the Fall River Area and these will be reviewed later in the present report in connection with the discussion of the results of the 1943 survey. The survey itself was made by Assistant Entomologist Jack W. Bongberg and the writer during the early part of November. Basic measurements were obtained from three roadside strips totalling 400 acres and the estimates of the timber damage from the 1942 infestation were founded partly on these and partly upon observations made throughout the area.

#### THE 1942 INFESTATION

The 1943 survey located, examined and marked some trees on the check strips which had been killed in 1942 after the 1942 survey was made and also some trees which had been killed in 1943. It is estimated that only about 85 percent of the total number of trees killed in 1943 had been killed when the 1943 survey was made, so that a complete record of trees killed in 1943 must await completion of the 1944 survey. Most of the discussion is hence devoted to the 1942 infestation, the most recent for which a full calendar year's record is available.

#### Insects Involved.

Pine bark beetles were the only important insects found attacking trees in this area during 1942. Of these the western pine beetle, Dendroctonus brevicornis Lec., was the most aggressive. Basal examinations of ponderosa pines infested by this species showed rather weak attacks

<sup>1/</sup> Miller, J. M., K. A. Salman and P. C. Johnson. Bark beetle hazards in the pine stands of northeastern California. Forest Insect Laboratory, Berkeley, California. May, 1941. Multilithed.

<sup>2/</sup> Hazard reduction cuttings remove from 25 to 75 percent of the stand volume in trees which are considered for their economic value and silvicultural characteristics as well as for their susceptibility to insect attack. A beetle control cutting, on the other hand, has for its sole objective the protection of the stands from beetles by means of beetle control logging operations, also known as sanitation-salvage operations, which remove only high beetle risk trees for utilization. These rarely comprise more than 25 percent of the stand volumes.

Table 1: Distribution of remaining virgin pine areas by beetle hazard classification <sup>1/</sup>. Fall River Area, Shasta and Siskiyou Counties.

Beetle Hazard Class	Virgin Pine Acreage	Type <sup>2/</sup> Percent	Average site Class	Location By Units
II - Low	21,660	50	II-III	Clark Creek
	15,320		II-III	Dickson Flat <sup>3/</sup>
	570		III	Dana
	510		II-III	Bear Creek
	38,060			
III - Moderate	3,380	45	IV-V	Wiley Ranch <sup>3/</sup>
	6,630		IV-V	Lava <sup>3/</sup>
	2,050		III	Bear Creek
	11,870		III	Cayton
	10,010		III-IV	Dana <sup>3/</sup>
	33,940			
III - High	3,350	5	IV-V	Cayton
	800		V	Dana
	4,150			

<sup>1/</sup> From Forest Insect Hazard Inventory, 1938

<sup>2/</sup> As of January 1, 1943

<sup>3/</sup> Heavy cutting during 1943 further reduces these acreage estimates.



which were frequently intermingled with those of the emarginate engraver beetle, Ips emarginatus Lec., and, in the small pole-sized trees, with attacks of the mountain pine beetle, D. monticolae Hopk. This condition has been characteristic of the infestations of the past two years and is a condition frequently met with during the endemic portion of infestation cycles.

The area continued to be relatively free of attacks in sugar pine by the mountain pine beetle. No infested sugar pines were encountered on the sample strips and only a very few were seen during the reconnaissance.

No important insect damage was noted in any of the cutover reserve stands examined.

#### Pine Mortality on the Sample Strips

All pine trees 10 inches and above, d.b.h., which had been killed by beetles during 1942 and 1943 were located, examined, marked and mapped on the sample strips. All the 1942 infested trees marked were ponderosa pines. Their occurrence on the strips ranged from 9 to 49 board feet per acre (Table 2) and from 0.1 to 0.5 percent of the pine stand.

Table 2: Pine timber killed by bark beetles on virgin sample strips. Fall River Area, Shasta and Siskiyou counties, California. Season of 1942.

ENTOMOLOGICAL UNIT	Strip No.	Timbered Acreage	Insect Hazard Rating	PINE STAND*		LOSS FOR 1942			
				Tree Spp.	Volume (m.b.m.)	No. of trees	Volume (b.m.)	Volume per acre	Percent of stand
Lava	RD-1	160	III	PP	1,510	6	7,840	49.0	0.5
Dana	RD-2	160	III	PP	2,760	1	1,410	8.8	0.1
Clark Creek	RD-3	80	II	PP	2,070	1	870	10.9	0.1

\* Pine stand volume estimates as of January 1, 1938

The extremely low infestation now current in this area does not offer an accurate picture of the year-to-year fluctuations on the individual sample strips or of the relative intensity of the infestation on areas of different beetle hazard. However, the differences which are apt to occur during such times are so small as to be comparatively unimportant.

The eight trees making up the loss shown in Table 2 were all mature or overmature with little distinction between those having healthy vigorous crowns and those that did not. A composite tree representative of these trees would be one having a diameter of 30 inches, and classed as a 5 by Dunning and a 4B or 4C by Keen. This appeared to represent also the average tree infested throughout the Fall River Area during 1943.



### Estimated Pine Mortality by Forest Areas

Approximately 1,300,000 board feet of ponderosa pine was killed by beetles on the Fall River Area in 1942 (Table 3). This is a reduction of 63 percent over the 3,500,000 board feet killed in 1941. Of this reduction, probably 58 percent was due directly to a decline in the infestation rate and the other 5 percent to the diminished virgin timbered acreage resulting from logging operations during 1942.

Table 3. Pine timber killed by bark beetles. Fall River Area, Shasta and Siskiyou counties, California. Season of 1942.

ENTOMOLOGICAL UNIT	PINE TYPE ACREAGE (January 1, 1943)			VIRGIN PINE STAND		TIMBER KILLED 1942			
	Virgin	Cutover	Total	Spp.	(M b.m.)	Trees	VOLUME		
						No.	M b.m.	b.m./ac.	% stand
Wiley Ranch	3,380	6,890	10,270	PP	35,420	140	140	40	0.4
Lava	6,630	1,850	8,480	PP	47,770	250	330	50	0.7
Bear Creek	2,560	42,190	44,750	PP	54,820	30	30	10	0.1
Dickson Flat	15,320	10,950	26,270	PP	281,640	200	170	11	0.1
				SP	103,980	none	none	none	none
Clark Creek	21,660	200	21,860	PP	226,650	280	240	11	0.1
				SP	192,610	none	none	none	none
Gayton	15,220	780	16,000	PP	134,200	150	150	10	0.1
				SP	30,960	none	none	none	none
Dana	11,380	7,620	19,000	PP	145,260	160	240	21	0.2
				SP	36,800	none	none	none	none
TOTAL	76,150	70,480	146,630	PP	925,760	1,210	1,300	17	0.1
				SP	364,350	none	none	none	none
				PP-SP	1,290,110	1,210	1,300	17	0.1

It is evident, both from the sample strips and from the reconnaissance that the heaviest mortality, on a per-acre basis, occurred in the Lava and Wiley Ranch Units. Losses here averaged 50 and 40 board feet respectively. Losses seemed progressively lower toward the higher country surrounding the headwaters of Clark, Bear and Rock Creeks. With the possible exception of the first-mentioned two units, the pine mortality from beetles was far below the probable gross increment of the stands in the Fall River Area and hence no timber depletion occurred.

### Trend of the Infestation

The 1942 infestation was the lightest which has occurred in this area since the annual records were begun in 1932 (Figure 1). This apparently reflects the continuation of the improved tree growing conditions of the past few years. The trees have no doubt gained in their capacity to resist attack, thus holding at a low level a beetle population now limited by the scarcity of low resistance trees in the stands.



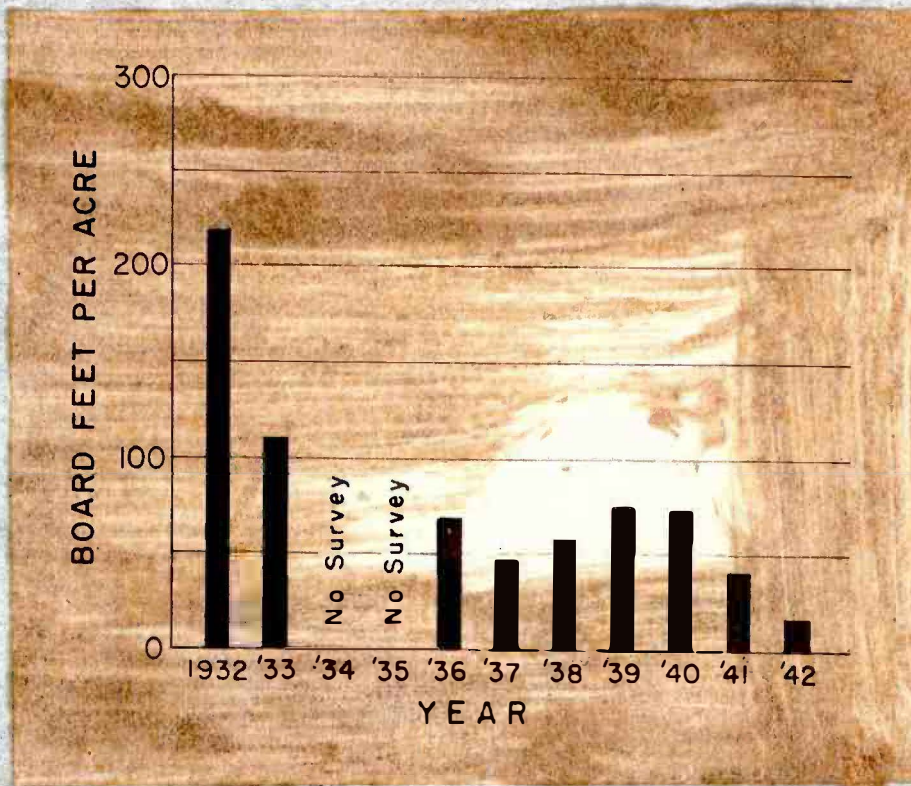


Figure 1.

Average annual per acre volume of pine timber killed since 1932 in the Fall River Area.

#### THE 1943 INFESTATION

About 85 percent of the trees which the beetles have probably killed during 1943 were visible when the survey was made. From all indications the 1943 infestation has not differed materially from that of the previous year. It is expected that the downward trend in effect since 1940 will flatten out somewhat, preparatory, even, to an increase in 1944. The 1943 infestation is already so low that any further decrease next year cannot be reasonably expected in view of the number of high risk trees which still dot the area.

#### INSECT CONTROL RECOMMENDATIONS

The absence of any serious infestation does not warrant any direct insect control measures anywhere in the reporting area at this time.

The insect control recommendations outlined last year <sup>1/</sup> for this area are still pertinent. Briefly, these call attention to the high beetle hazard conditions prevalent in the Wiley Ranch, Lava, Dana and Cayton Units and the advisability of directing logging operations into these units so that the timber resources can be utilized before

<sup>1/</sup> Johnson, Philip C. and Charles B. Eaton. Forest insect survey, Fall River Area, Shasta Nat'l Forest, California. Season of 1942. Unpublished report of the Forest Insect Laboratory; Berkeley, California. May 5, 1943.



those from the less hazardous areas. This still appears to be the best action to take now solely from an entomological point of view. Right now, of course, logging concerns are faced with serious shortages of men and equipment which makes it necessary for them to consider the possibility of getting out the heaviest volumes per man or unit of equipment. As a result, logging operations may be moved to the heavy per-acre low beetle hazard stands on the better sites where this can be accomplished.

Judging from Table 1, about 50 percent of the remaining 76,000 acres of virgin stumpage are in moderate (III) and high (IV) beetle hazard areas. These are the only areas justifying beetle control action in the Fall River Area, except for the suppression of any sudden outbreaks which may appear in the low hazard (II) stands. To minimize the damage to pine timber in the higher hazard areas caused by beetles up to the time the virgin stands are finally cutover, the following courses of action are recommended:

1. Concentrate logging for the next few years, or until the timber is fully utilized, in the Lava, Dana and Cayton Units. There are now about 30,000 acres of timber in these units, all of which could be utilized during the course of normal logging operations. The result will be to salvage the timber as soon as possible from these higher beetle hazard areas in the shortest time.

2. If the areas in (1) above cannot be entirely utilized before other low hazard areas are cut, some form of hazard reduction or beetle control logging treatment should be practiced in those parts of the Lava, Dana and Cayton Units; depending upon the length of time beetle protection is desired. This would involve a selection cutting to remove from the stands an average of 1,500 board feet or more per acre, all of which could be utilized into lumber grades equal to or better than the average of the whole stand.